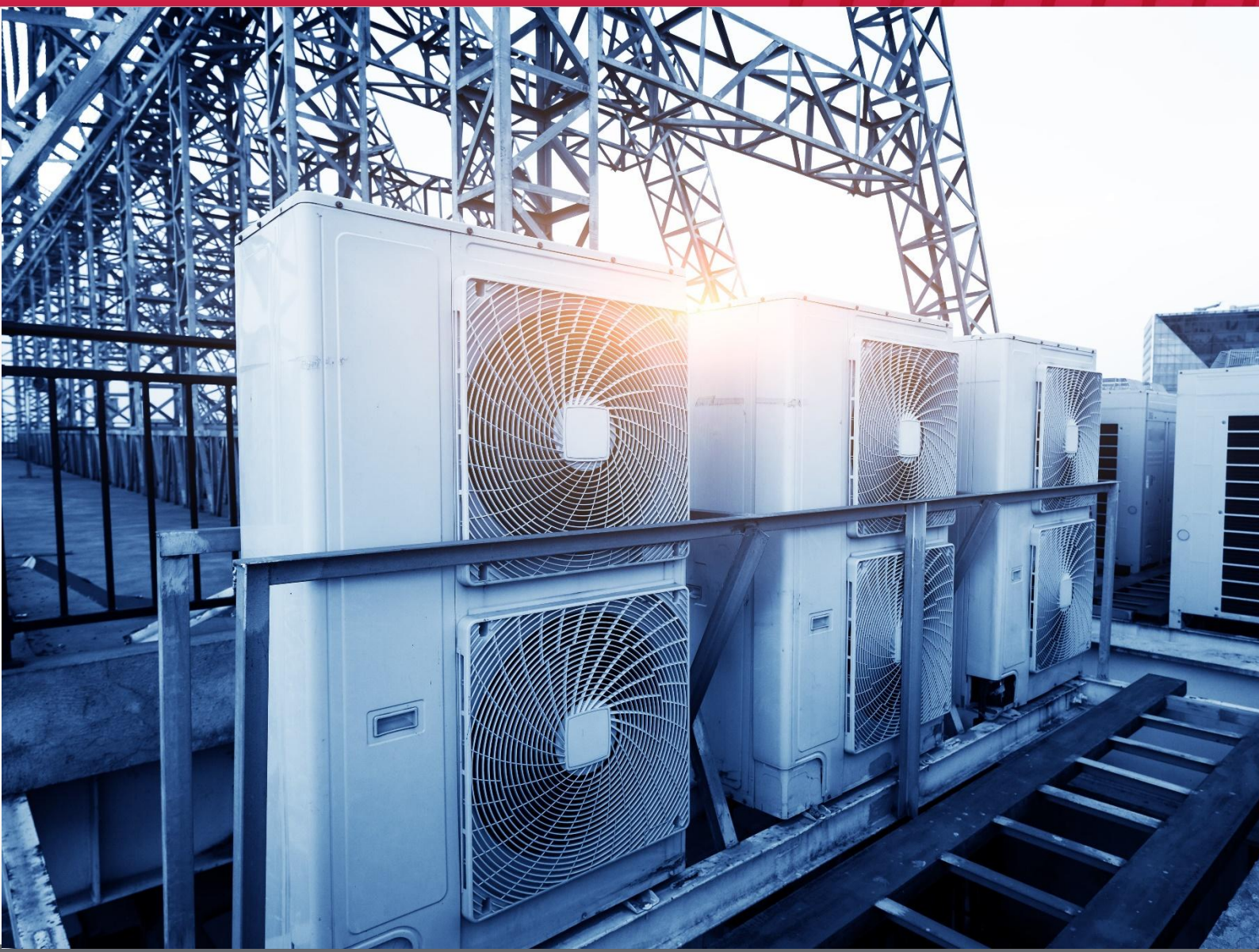
MZA ACOUSTICS

X+WHY, THE HIVE, MANCHESTER

Planning Condition 5 Part 1 Discharge Report –Plant Noise Emissions



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1. INTRODUCTION

MZA Acoustics has been appointed to undertake an assessment of external plant noise emissions from the proposed new plant equipment associated with the tenant fitout (x+why) at The Hive located at 49-53 Lever Street, Manchester, M1 1FN (the Site).

The granted planning permission (application reference 143714/FO/2025) is for external alterations to the building façade, including the creation of new entrances, modification to existing mesh screen, installation of roof top plant and associated screen and installation of fume extraction equipment.

This report presents the details of the baseline environmental noise survey at the site and plant noise emission calculations undertaken to demonstrate compliance with the criteria of Condition 5 imposed by Manchester City Council (MCC).

This report occasionally employs technical language. To assist the reader, a glossary of acoustic terminology is presented in Appendix A.

2. SITE DESCRIPTION

2.1 Site Location

The Hive is an 80,000 sq ft, seven storey office and retail building on Lever Street in Manchester's Northern Quarter, completed in 2010.

The site is bounded by Warwick Street to the north, Lever Street to the east, Faraday Street to the south and Spear Street to the west. Approximately 105 metres to the north of the site lies Great Ancoats Street.

The site is located in a mixed commercial and residential area, with the nearest existing residential buildings located at 70 Spear Street and 5 Warwick Street.

There are also a number of consented residential schemes in the area, the nearest identified being at:

- 68-70 Oldham Street / 61 Spear Street - a 10-storey aparthotel scheme (application 134953/FO/2022); and
- 47 Spear Street – a 6-storey residential scheme (application 136117/FO/2023).

The nearest off-site noise-sensitive receptors (NSR), including the consented schemes, are highlighted blue in **Figure 1**.

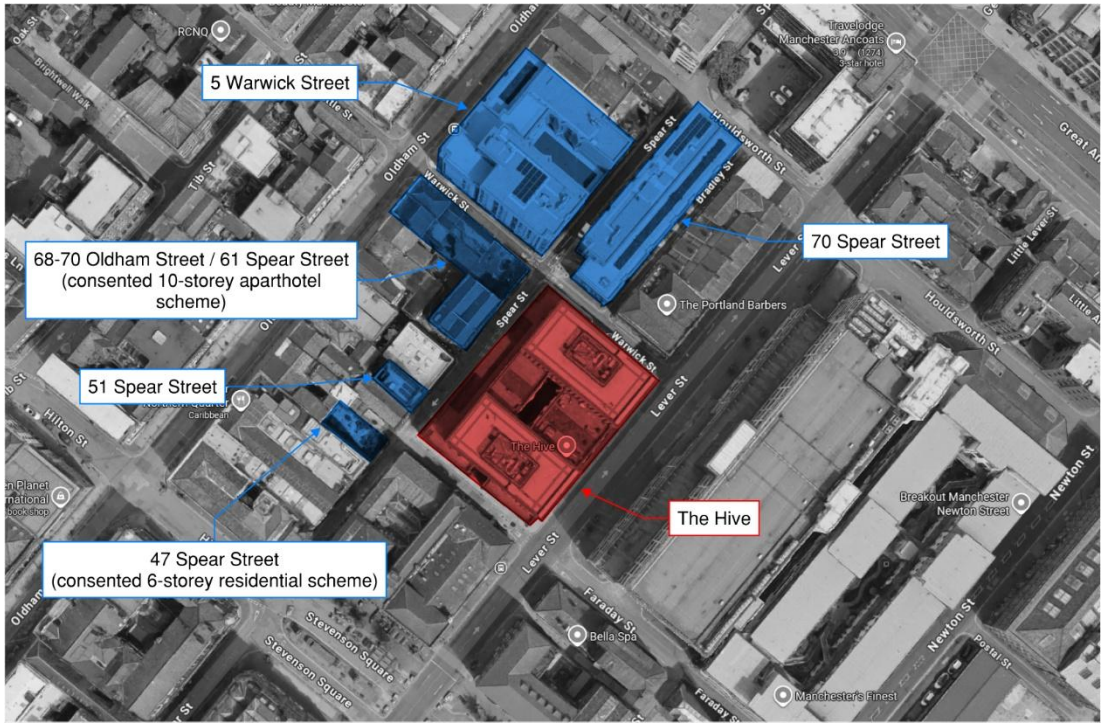


Figure 1: Site location with approximate red line boundary

2.2 Development Proposals

Internal work proposals include the full strip out of the existing spaces and the Cat B office fitout for the tenant (x+why) to the partial ground and second floor levels and the entire first floor level to provide co-working and office rental spaces.

As part of these works, new heat rejection plant at roof level and mechanical ventilation with heat recovery on the abovementioned fitout floors is proposed.

3. GUIDANCE AND CRITERIA

3.1 Planning Condition 5

The site has been granted planning consent, of which Condition 5 pertains to the control of external plant noise emissions from the proposed new plant.

Planning Condition 5 reads as follows:

> *"a) Prior to the commencement of any works to the roof, all ancillary plant and equipment shall be selected and acoustically insulated in accordance with a scheme submitted to and approved in writing by the City Council as local planning authority in order to secure a reduction in the level of noise emanating from the equipment, including mitigation measures, calculations providing in a rating table to include reductions used for distance and screening to demonstrate how the rating at the report has been determined.*
>
> *Externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a rating level of 5dB (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location.*
>
> *b) Upon completion of the development and prior to the use of the equipment, a verification report will be required to validate that the work undertaken throughout the development conforms to the recommendations and requirements in the approved acoustic consultant's report. The report shall also undertake post completion testing to confirm that above criteria is met. Any instances of non-conformity with the recommendations in the report shall be detailed along with any measures required to ensure compliance with the noise criteria. This report shall be submitted to and approved in writing by the City Council as local planning authority within 6 months of the equipment becoming operational along with a timescale that confirms when any necessary changes will be implemented.*
>
> *Reason - To safeguard the amenities of the occupiers of nearby residential accommodation, pursuant to saved policy DC26 of the Unitary Development Plan for the City of Manchester and policies SP1 and DM1 of the Core Strategy."*

This report is produced to support the discharge of Condition 5 part A and is specifically in relation to the new plant associated with the x+why office fitout only.

3.1.1 BS 4142:2014+A1:2019 Methods for Rating and Assessing Industrial and Commercial Sound

BS 4142 provides a methodology for rating and assessing sound associated with both industrial and commercial premises. The purpose of the Standard is clearly outlined in the opening section where it states that the method is appropriate for the consideration of:

- Sound from industrial and manufacturing processes;
- Sound from fixed installations which comprise mechanical and electrical plant and equipment;
- Sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and
- Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train movements on or around an industrial and/or commercial site.

The Standard is based around the premise that the significance of the noise impact of an industrial/commercial facility can be derived from the numerical subtraction of the background noise level (not necessarily the lowest background level measured, but the typical background of the receptor) from the measured/calculated rating level of the specific sound under consideration.

This comparison will enable the impact of the specific sound to be concluded based upon the premise that typically "the greater this difference, the greater the magnitude of the impact".

This difference is then considered as follows:

- A difference of around +10 dB or more is likely to be an indication of a **significant adverse impact**, depending on the context.
- A difference of around +5 dB is likely to be an indication of an **adverse impact**, depending on the context.
- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a **low impact**, depending on the context."

The Standard further qualifies the assessment protocol by outlining conditions to the comparative assessment and stating that "not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact", thus implying that all sites should be assessed on their own merits and specifics.

The Standard quantifies the typical reference periods to be used in the assessment of noise, namely:

- Typical Daytime 07:00 – 23:00 1-hr assessment period
- Typical Night-time 23:00 – 07:00 15-min assessment period

The Standard also outlines methods for defining appropriate “character corrections” within the rating levels to account for tonal qualities, impulsive qualities, other sound characteristics and/or intermittency. These are:

a. the Subjective Method,

b. the Objective Methods for tonality; and,

c. the Reference Method.

It is noted by the Standard that where multiple features are present the corrections should be added in a linear fashion to the specific level.

Table 1: BS 4142 subjective method rating correction

Level of Perceptibility	**Tonal Correction dB**	**Impulsivity Correction dB**	**Correction for ‘other sound characteristics’ dB**	**Intermittency Correction dB**
No Perceptibility	+0	+0	Where neither tonal nor impulsive but clearly identifiable +3	If intermittency is readily identifiable +3
Just Perceptible	+2	+3		
Clearly perceptible	+4	+6		
Highly perceptible	+6	+9		

4. BASELINE ENVIRONMENTAL NOISE SURVEY

4.1 Overview

MZA Acoustics has undertaken a baseline environmental noise survey to establish the existing background noise levels, against which noise emissions from proposed plant would be assessed.

The survey comprised long-term, unattended monitoring at two positions on the site.

The survey commenced at approximately 11:10 on Wednesday 24th and ended at 11:40 on Friday 26th September 2025.

Weather conditions were measured during periods of attendance on site and historical data from nearby weather stations reviewed for the duration of the survey. Conditions remained dry with windspeeds below 5 m/s and generally from the east-northeast. Temperatures averaged approximately 8°C.

4.2 Measurement Locations

The measurement locations are shown on the site plan in **Figure 2** and described as:

- LT1 – Long-term monitoring location (circa 48 hours). Microphone extended 1 m from façade out of a first floor level window on east elevation (directly overlooking Lever Street).
- LT2 – Long-term monitoring (circa 48 hours). Microphone extended 1 m from façade out of a first floor window on north elevation to the rear of the site (directly overlooking Warwick Street).

To account for the presence of façade reflections, a -3 dB correction has been applied to the measured results to obtain a free-field level.

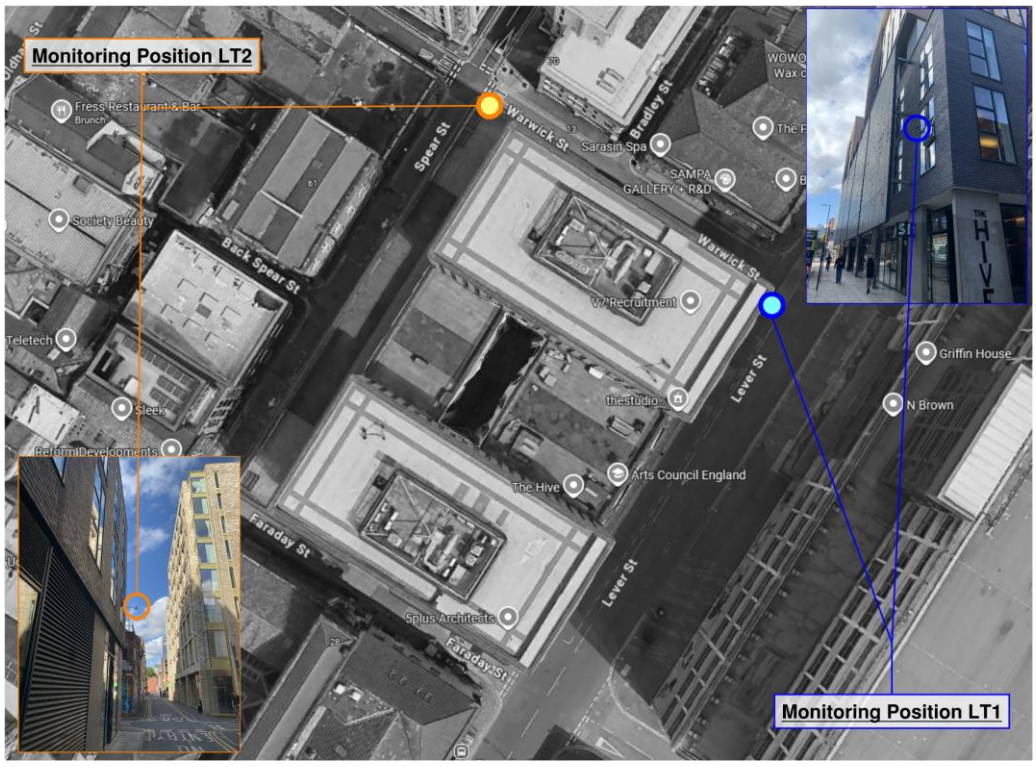


Figure 2: Measurement locations

4.3 Site Observations

The ambient and background noise levels at both measurement positions were characterised by local and distant road traffic noise. Community/pedestrian noise was occasionally audible.

Warwick Street and Spear Street are narrow, one-way street, as such, traffic was slow and minimal.

Road works were noted at the junction of Houldsworth Street and Lever Street, but this did not appear to significantly impact traffic flow on Lever Street, which continued to the traffic light junction to the busy Great Ancoats Street.

4.4 Baseline Environmental Noise Survey Results

The free-field measurement results at LT1 and LT2, rounded to the nearest whole dB, are presented in **Table 2**. A graphical time-history and statistical analysis of the measured background levels is presented in Appendix B.

The following has been used to determine the presented noise levels:

- The daytime and night-time periods are taken to be 07:00 to 23:00 and 23:00 to 07:00, respectively. Office hours are taken to be 09:00 to 17:00.
- Data from the end of the survey, on Friday 26th September, has been prepended to the measurement data at the start of the survey on Wednesday 24th September to form two full 24-hour periods of measurement. The $L_{Aeq,T}$ levels presented are the arithmetic average of the two 16-hour daytime, two 8-hour night-time and 8-hour office measurement periods.
- The presented background sound levels ($L_{AF90,T}$) have been derived by analysing the typically occurring background level, where the reference period (*T*) is 1-hour in the daytime and 15-minutes in the night-time, in accordance with BS 4142.

Table 2: Long-term measurement results (free-field)

Position	Period	Equivalent Continuous Noise Level [1] dB $L_{Aeq,T}$	Background Sound Level [2] $L_{AF90,T}$
LT1	Daytime 07:00 – 23:00	62	50
	Night-Time 23:00 – 07:00	58	40
	Office Hours 09:00 – 17:00	62	50
LT2	Daytime 07:00 – 23:00	55	49
	Night-Time 23:00 – 07:00	51	37
	Office Hours 09:00 – 17:00	56	50

[1] Arithmetic average of the two 16-hour daytime (07:00 – 23:00), 8-hour night-time (23:00 – 07:00) and 8-hour office periods.
[2] Derived by analysing the typically occurring background level where the reference period (*T*) is 1-hour in the daytime and 15-minutes in the night-time, in accordance with BS 4142.

5. BS 4142 NOISE IMPACT ASSESSMENT

5.1 Introduction

This section outlines the noise emission limits and assessments of the proposed mechanical services plant associated with the development.

5.2 Nearest Noise-Sensitive Receptors

Based on online mapping information, a postcode search on the council tax register and review of the online planning portal, the nearest noise-sensitive receptors (NSRs) are understood to be those highlighted in **Figure 3**, and identified as the following:

- NSR 1: 70 Spear Street
- NSR 2: 5 Warwick Street
- NSR 3: 68-70 Oldham Street / 61 Spear Street (consented 10-storey aparthotel)
- NSR 4: 51 Spear Street
- NSR 5: 47 Spear Street (consented 6-storey residential scheme)

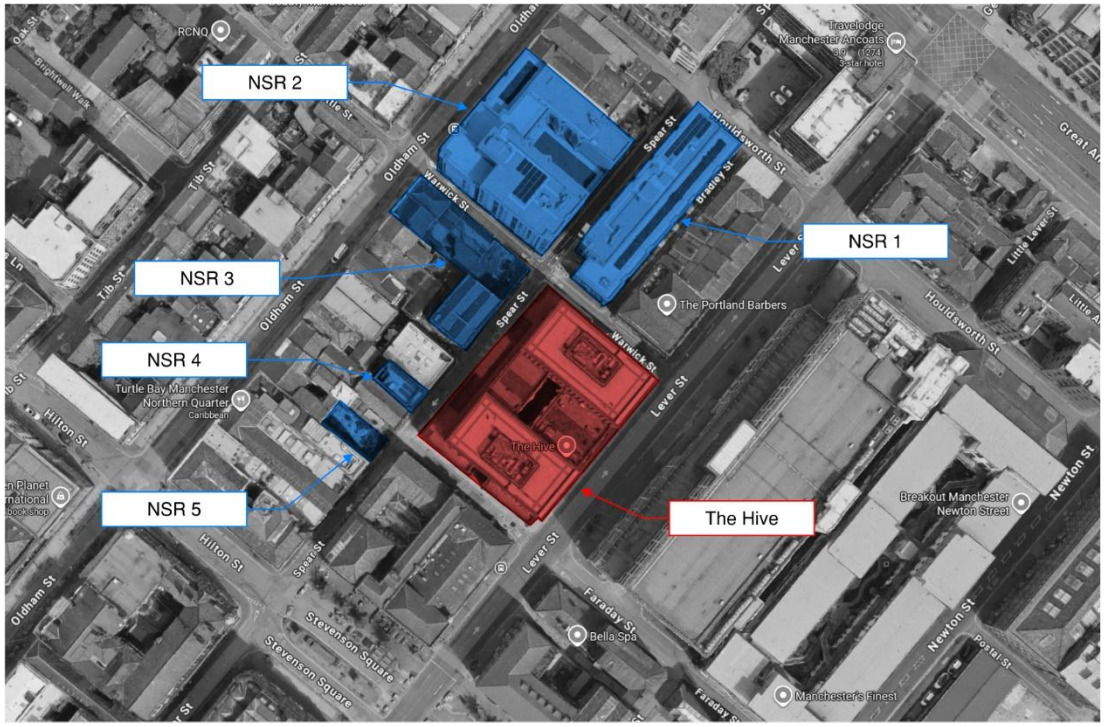


Figure 3: Location of NSRs

The assessment accounts for existing and future residential NSRs of consented schemes nearby as a worst-case.

It should also be noted that, once constructed, NSR 3 would overlook The Hive roof and therefore receive no screening from barriers or intervening buildings between it and the plant.

Other NSRs are located nearby but these are generally at a similar or greater distance to the plant or benefit from screening from existing buildings, therefore plant noise emissions are expected to be the same or lower.

5.3 Proposed Plant Information

5.3.1 Proposed Plant Locations

The proposed noise-generating mechanical plant comprises eight Daikin Variable Refrigerant Volume (VRV) condensing units located within the roof plant compounds at 47 Lever Street and 51 Lever Street, as follows:

47 Lever Street Roof Plant Compound:

- VRV 00-01 – Daikin REYA16A9
- VRV 01-01 – Daikin REYA22A9
- VRV 01-04 – Daikin REYA18A9
- VRV 02-01 – Daikin REYA16A9

51 Lever Street Roof Plant Compound:

- VRV 00-02 – Daikin REYA10A9
- VRV 01-02 – Daikin REYA12A9
- VRV 01-03 – Daikin REYA16A9
- VRV 02-02 – Daikin REYA16A9

The proposed roof plant arrangement is presented in **Figure 4**. The layout shows existing mechanical plant (greyed out), which does not form part of this condition discharge and has therefore been excluded from this assessment.

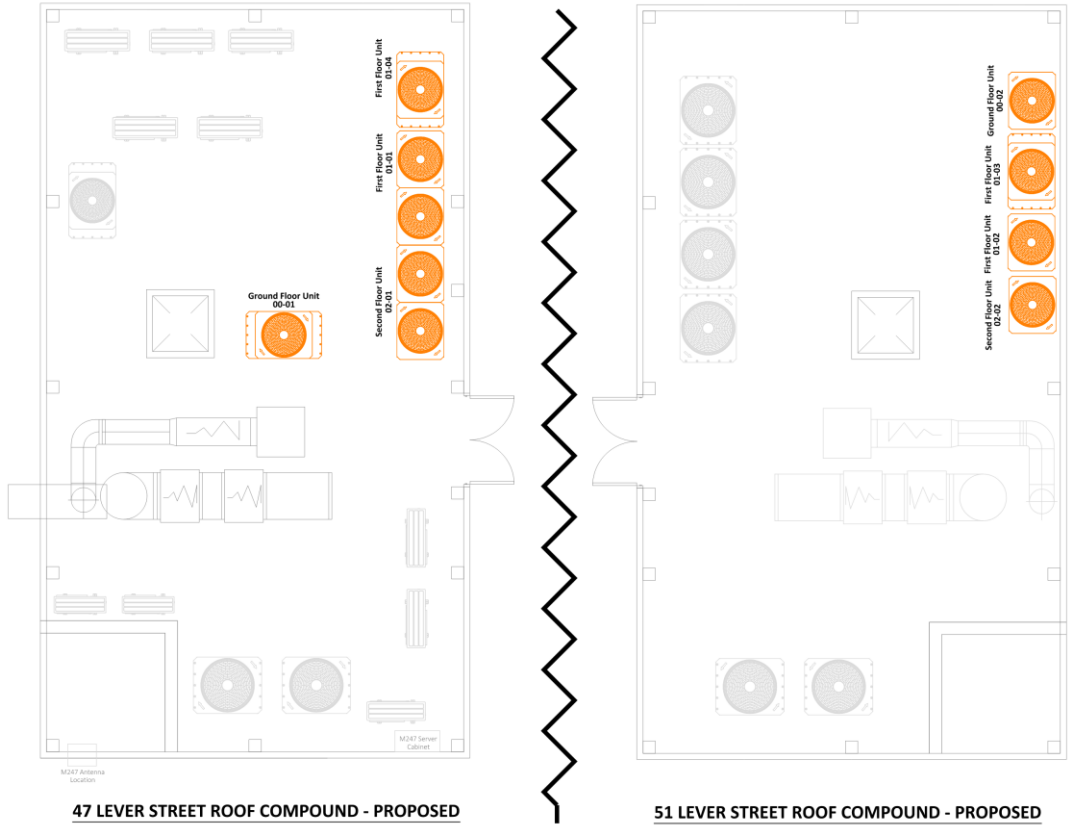


Figure 4: Roof plant layout (proposed roof plant in orange)

The Mechanical Ventilation with Heat Recovery (MVHR) units are located internally within the building. Accordingly, only noise emissions from the external air intake and discharge terminations have been assessed, and only where these are in proximity to, or directly face, an identified NSR.

5.3.2 Proposed Plant Noise Data

Manufacturer's octave band sound power/pressure level data for the proposed VRV and MVHR equipment is provided in Appendix C.

The manufacturer's data for the MVHR units does not include sound power levels in the 63 Hz octave band. However, low-frequency noise is not typically a dominant characteristic of MVHR units of this type and size and the required attenuation of the MVHR terminations will ensure predicted noise levels that are substantially below both the VRV plant noise emissions and the prevailing background sound levels. The omission of the 63 Hz octave band is therefore not considered to materially affect the conclusions of this assessment.

5.4 Proposed Operating Hours & Scenarios

The proposed building services plant may operate during both the daytime and night-time periods in response to the heating, cooling and ventilation demands of the building.

To inform the noise assessment, the project mechanical engineer has provided the anticipated operating capacities of each VRV unit for representative heating and cooling conditions. These operating capacities reflect the expected peak demand within the zones served by each unit and have been used to determine the corresponding plant noise emissions for assessment against the prevailing background sound levels.

The proposed Low Noise (LN) settings for each VRV unit are summarised in **Table 3**.

Table 3: VRV operating capacities

Plant Ref.	Roof Compound	Mode	Low Noise Setting	Period
00-01	47 Lever Street	Cooling	LN1	Daytime (No night-time operation)
00-02	51 Lever Street		LN2	
01-01	47 Lever Street		LN2	
01-02	51 Lever Street		LN1	
01-03	51 Lever Street		LN2	
01-04	47 Lever Street		LN3	
02-01	47 Lever Street		LN4	
02-02	51 Lever Street		LN4	
00-01	47 Lever Street	Heating	LN5	Daytime and Night-time
00-02	51 Lever Street		LN5	
01-01	47 Lever Street		LN5	
01-02	51 Lever Street		LN5	
01-03	51 Lever Street		LN5	
01-04	47 Lever Street		LN5	
02-01	47 Lever Street		LN5	
02-02	51 Lever Street		LN5	

During both the daytime heating and cooling periods, the VRV units will automatically vary their output in response to the heating and cooling demands of the building. Although the project mechanical engineer has confirmed that all units are not expected to operate simultaneously under normal conditions, the daytime assessment assumes concurrent operation of all VRV units at the capacities shown in **Table 3**. This represents a robust worst-case assessment of the proposed daytime operating strategy.

During the night-time period, cooling is not required and the building will operate in heating mode only, as necessary. To maintain the minimum internal background temperature of 17°C whilst limiting noise emissions, the proposed control strategy restricts operation to a single pair of VRV units serving one floor level at a time. The second floor will be heated by only a single unit (02-01) at night. Allowing the units to maintain a minimum temperature throughout the night prevents them needing to operate at a higher (noisier) capacity in the early morning period when building occupants begin arriving.

The night-time operational heating scenarios assessed in this report are presented in **Table 4**.

Table 4: VRV night-time heating scenarios

Scenario	Plant Ref.	Roof Location	Low Noise Mode
1	00-01	47 Lever Street	LN5
	00-02	51 Lever Street	
2	01-01	47 Lever Street	
	01-02	51 Lever Street	
3	01-02	51 Lever Street	
	01-04	47 Lever Street	
4	02-01	47 Lever Street	
	01-02	51 Lever Street	

To allow flexibility in maintaining the internal background temperatures at night, first floor unit 01-02 has been included in Scenario 4 with the second-floor unit.

The Mechanical Ventilation with Heat Recovery (MVHR) units are proposed to operate at a constant duty during the daytime period only and will not operate during the night-time period.

5.5 Plant Noise Emission Limits

It is understood that no tenant-specific plant noise limits have been stipulated by the Landlord. Accordingly, the cumulative plant noise limits for the proposed building services plant have been derived from the background sound levels measured by MZA Acoustics and the requirements of Manchester City Council Planning Condition 5.

The applicable cumulative rating level limits, expressed as façade sound pressure levels, are presented in **Table 5**. Appropriate façade corrections have been applied to the calculated plant noise levels to ensure consistency with these limits.

The background sound levels measured at monitoring position LT2 are considered representative of the identified Noise Sensitive Receptors (NSRs) and have therefore been adopted for determining the assessment criteria.

Table 5: Plant noise emission limits at the nearest NSRs (façade levels)

NSR	Period	Typical Background Sound Level	Cumulative Rating Plant Noise Limit
All (Measurement Position LT2)	Daytime (07:00 – 23:00)	52 dB $L_{AF90,1hr}$	47 dB $L_{Ar,Tr}$
	Night-time) 23:00 – 07:00	40 dB $L_{AF90,15min}$	35 dB $L_{Ar,Tr}$

5.6 Proposed Acoustic Mitigation Measures

The plant noise emissions calculated in the below assessments are based on the manufacturer specified noise data and the following acoustic mitigation measures, which shall be installed.

5.6.1 Operational Control Strategy

The proposed operational control strategy forms an integral part of the acoustic mitigation measures.

As described in Section 5.4, compliance relies upon the VRV systems operating within the specified Low Noise modes and, during the night-time period, in accordance with the defined operating scenarios. These operational controls have been incorporated into the calculations presented in this report and shall be implemented through the Building Management System (BMS).

5.6.2 Acoustic Screening

Acoustic screening between the proposed plant and the identified NSRs is provided by the surrounding building structures, including the roof parapets and building envelope.

The screening effects, together with distance attenuation and other propagation effects, have been incorporated within the 3D computer noise model developed in Datakustik CadnaA 2025.

The calculations have been undertaken in accordance with ISO 9613-2:2024 *Acoustics – Attenuation of sound during propagation outdoors — Part 2: Engineering method for the prediction of sound pressure levels outdoors*.

5.6.3 MVHR In-line Acoustic Attenuators

The atmosphere-side air paths (fresh air intake and exhaust) of the MVHR units shall be fitted with in-line acoustic attenuators where required to control breakout noise at the façade terminations.

As noted previously, given the relatively low noise emissions of the MVHR units, attenuation has only been specified where terminations are located in proximity to, or directly face, an identified NSR.

The minimum dynamic insertion loss requirements are provided in the schedule contained within Appendix D.

5.7 3D Computer Noise Model

To predict the propagation of noise from the proposed plant, a 3D computer noise model of the site and surrounding area has been created in Datakustik CadnaA 2025 software. A screengrab of the base model is presented in **Figure 5**.

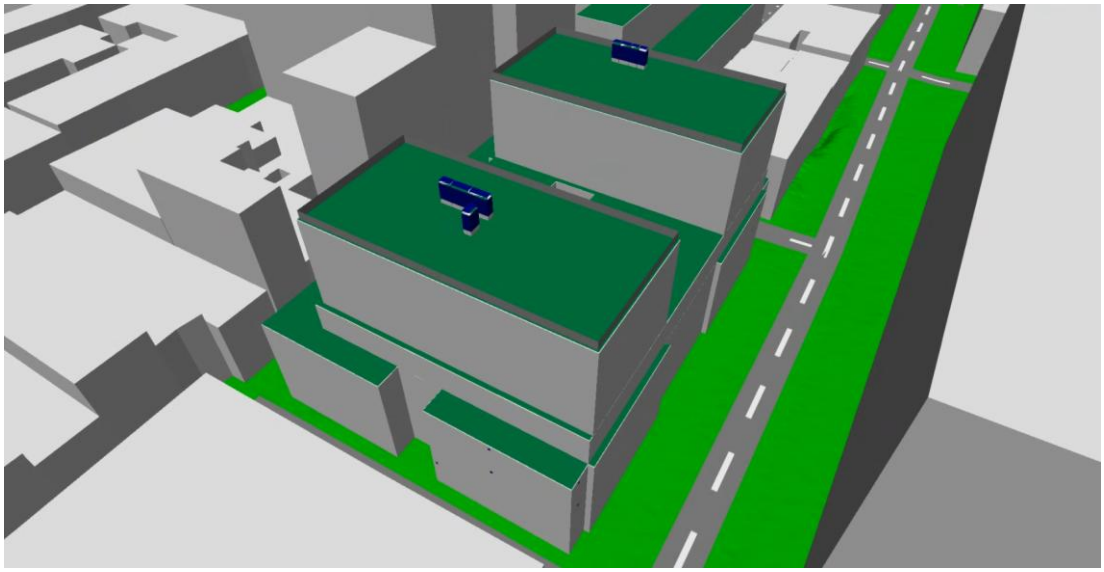


Figure 5: 3D noise model

The model has been configured as follows:

- Topographical data has been obtained from the Government Environmental Agency's National LIDAR Programme.
- A ground absorption coefficient of 0.0 (hard, fully reflective ground) has been adopted.
- The model accounts for a reflection order of three.
- Geometries of roads, buildings, barriers, and other object types are derived from a combination of:
  - Open Street Map,
  - Satellite imagery, and
- Architectural plans, sections, and elevation drawings (specifically for the HPDS building).
- Plant noise sources are inserted as a combination of:
  - Point sources, and
  - Horizontal and vertical area sources (as illustrated in blue above).

5.8 Plant Noise Results and Assessment

The predicted plant noise levels at each identified NSR are summarised in Table 6 alongside the corresponding cumulative rating level limits.

The results represent the worst-case predicted rating level for each daytime and night-time operating scenario. Façade noise maps are provided in Appendix E, which show the highest predicted level per façade. The sound pressure levels of individual plant items at the worst-case receptor (NSR 3) are also provided for reference.

For consistency with the measured background sound levels, all calculated noise levels are presented as free-field sound pressure levels at a position 1 m from the façade.

Table 6: Plant noise assessment results (free-field levels)

NSR	Period	Scenario	Rating Level Limit dB $L_{Ar,Tr}$	Calculated Specific Noise Level dB L_{Aeq}	Acoustic Feature Correction dB	Calculated Rating Level dB $L_{Ar,Tr}$
1	Daytime	Cooling	47	38	0	**38**
		Heating		36	0	**36**
	Night-time	Heating – Scenario 1	35	27	0	**27**
		Heating – Scenario 2		26	0	**26**
		Heating – Scenario 3		27	0	**27**
		Heating – Scenario 4		28	0	**28**
2	Daytime	Cooling	47	39	0	**39**
		Heating		37	0	**37**
	Night-time	Heating – Scenario 1	35	27	0	**27**
		Heating – Scenario 2		26	0	**26**
		Heating – Scenario 3		28	0	**28**
		Heating – Scenario 4		28	0	**28**

NSR	Period	Scenario	Rating Level Limit dB $L_{Ar,Tr}$	Calculated Specific Noise Level dB L_{Aeq}	Acoustic Feature Correction dB	Calculated Rating Level dB $L_{Ar,Tr}$
3	Daytime	Cooling	47	46	0	**46**
		Heating		43	0	**43**
	Night-time	Heating – Scenario 1	35	35	0	**35**
		Heating – Scenario 2		33	0	**33**
		Heating – Scenario 3		34	0	**34**
		Heating – Scenario 4		35	0	**35**
4	Daytime	Cooling	47	39	0	**39**
		Heating		37	0	**37**
	Night-time	Heating – Scenario 1	35	28	0	**28**
		Heating – Scenario 2		25	0	**25**
		Heating – Scenario 3		26	0	**26**
		Heating – Scenario 4		28	0	**28**

NSR	Period	Scenario	Rating Level Limit dB $L_{Ar,Tr}$	Calculated Specific Noise Level dB L_{Aeq}	Acoustic Feature Correction dB	Calculated Rating Level dB $L_{Ar,Tr}$
5	Daytime	Cooling	47 dB $L_{Ar,Tr}$	37	0	**37**
		Heating		34	0	**34**
	Night-time	Heating – Scenario 1	35 dB $L_{Ar,Tr}$	26	0	**26**
		Heating – Scenario 2		22	0	**22**
		Heating – Scenario 3		24	0	**24**
		Heating – Scenario 4		26	0	**26**

5.8.1 Acoustic Feature Corrections

Based on a review of the calculated receiver spectra, the proposed plant is not expected to exhibit any perceptible tonal characteristics at the identified NSRs.

The principal plant items comprise inverter-driven VRV units operating at variable speed. Consequently, impulsive noise characteristics are not anticipated.

Whilst individual units will modulate their output in response to building demand, these changes occur gradually and independently across the system. Accordingly, intermittency is not expected to be readily perceptible at the identified NSRs.

Furthermore, the development is located within a mixed commercial environment where existing building services plant and general urban activity already contribute to the prevailing acoustic environment. The predicted plant rating levels remain below the applicable assessment criteria in all assessed operating scenarios and are therefore not expected to give rise to any distinguishable acoustic character requiring a BS 4142 acoustic feature correction.

5.8.2 Discussion and Summary of Results

The assessment demonstrates that, subject to implementation of the operational control strategy and acoustic mitigation measures described in Section 5.6, the cumulative rating level from the proposed building services plant achieves the noise limits derived from Planning Condition 5 during both the daytime and night-time periods.

During the daytime period, compliance is demonstrated assuming concurrent operation of all VRV units at the specified Low Noise settings, representing a robust worst-case assessment.

During the night-time period, compliance is achieved through implementation of the defined heating operating scenarios described in Section 5.4, whereby operation is restricted to a single pair of VRV units serving one floor level at a time to maintain the minimum internal temperature.

On this basis, the proposed building services plant is not expected to give rise to adverse noise impacts at the nearest Noise Sensitive Receptors and is therefore considered capable of satisfying the requirements of Planning Condition 5.

6. CONCLUSIONS

MZA Acoustics has been appointed to undertake an assessment of external plant noise emissions from the proposed new plant equipment associated with the tenant fitout (x+why) at The Hive located at 49-53 Lever Street, Manchester, M1 1FN (the Site).

This report presents the findings of the plant noise assessment undertaken to support the discharge of Planning Condition 5 attached to planning permission reference 143714/FO/2025 granted by Manchester City Council.

A baseline environmental noise survey was undertaken by MZA Acoustics to establish representative background sound levels at the nearest Noise Sensitive Receptors (NSRs). These measured background levels have subsequently been used to derive cumulative plant noise emission limits in accordance with the requirements of Planning Condition 5.

Based on the manufacturer's sound power level data, plant noise emission calculations have been undertaken using a 3D computer noise model developed in Datakustik CadnaA 2025. The assessment has considered the proposed operational control strategy for the VRV systems, acoustic screening provided by the building, and the installation of in-line attenuators to selected MVHR air paths where required.

The assessment demonstrates that, subject to implementation of the operational control strategy and acoustic mitigation measures detailed within this report, the cumulative rating level from the proposed building services plant is predicted to comply with the noise limits derived from Planning Condition 5 during both the daytime and night-time assessment periods.

In accordance with Planning Condition 5, post-installation commissioning measurements will be undertaken in accordance with BS 4142 to verify compliance with the planning condition 5 criteria following completion of the works. As the VRV systems are demand-controlled and continuously modulate their output in response to building occupancy, internal heat gains and external environmental conditions, the operating state of the plant during the verification survey will depend upon the prevailing conditions at the time of testing. The verification measurements will therefore be undertaken under representative operating conditions that reflect the assessed operating scenarios as closely as reasonably practicable.

The limitations to this report are presented in Appendix F.

Appendices

Appendix A - Glossary of Acoustic Terminology

Acoustics and Noise

Acoustics is the branch of physics concerned with the properties of sound, including ultrasound, infrasound and vibration. A scientist or engineer who works in the field of acoustics is an acoustician or acoustic engineer.

Sound can be measured by a sound level meter or other measuring system. Noise is related to a human response, and is routinely described as unwanted sound, or sound that is considered undesirable or disruptive.[1] Care has been taken in this document to use the most relevant of these terms (whereby 'sound' is used predominantly); however, in most reference documents, and, indeed, generally, 'sound' and 'noise' are used interchangeably. Consequently, just because the term 'noise' is used doesn't necessarily mean a negative effect exits or will occur, and the context of the accompanying text should be taken into account.

Human hearing is able to respond to sound in the frequency range 20 Hz (deep bass) to 20,000 Hz (high treble), and over the audible range of 0 dB (the threshold of perception) to 140 dB (the threshold of pain).

The ear does not respond equally to different frequencies of the same magnitude but is more responsive to mid-frequencies than to lower or higher frequencies. To quantify sound in a manner that approximates the response of the human ear, a weighting mechanism is used, which reduces the importance of lower and higher frequencies in a similar manner to human hearing.

The weighting mechanism that best corresponds to the response of the human ear (though not necessarily perfectly) is the 'A'-weighting scale. This is widely used for environmental sound measurement, and the levels are denoted as dBA, dB(A) or L_{Aeq}, L_{A90} etc. according to the metric being measured or determined (see the Definitions over leaf).

The decibel scale is logarithmic rather than linear, and hence a 3 dB increase in sound level represents a doubling of the sound energy present. Judgement of sound is subjective, but as a general guide a 10 dB increase can be taken to represent a doubling of loudness, whilst an increase in the order of 3 dB is generally regarded as the minimum difference needed to perceive a change under normal listening conditions. Where other changes occur (associated with the change in sound level), such as additional vehicle movements on a road, which can be seen, then these may result in changes in sound level being more noticeable than they might otherwise be.

Further to such visual clues, and any other non-acoustical factors that affect people's response (such personal characteristics, and social, residential or environmental factors), the subjective response to a sound is dependent not only upon the sound pressure level and component frequencies, but also its intermittency. Consequently, various metrics have been developed to try and correlate people's attitudes to different sounds with the sound level and its fluctuations. The metrics used in this document, as per the relevant guidance, are defined overleaf.

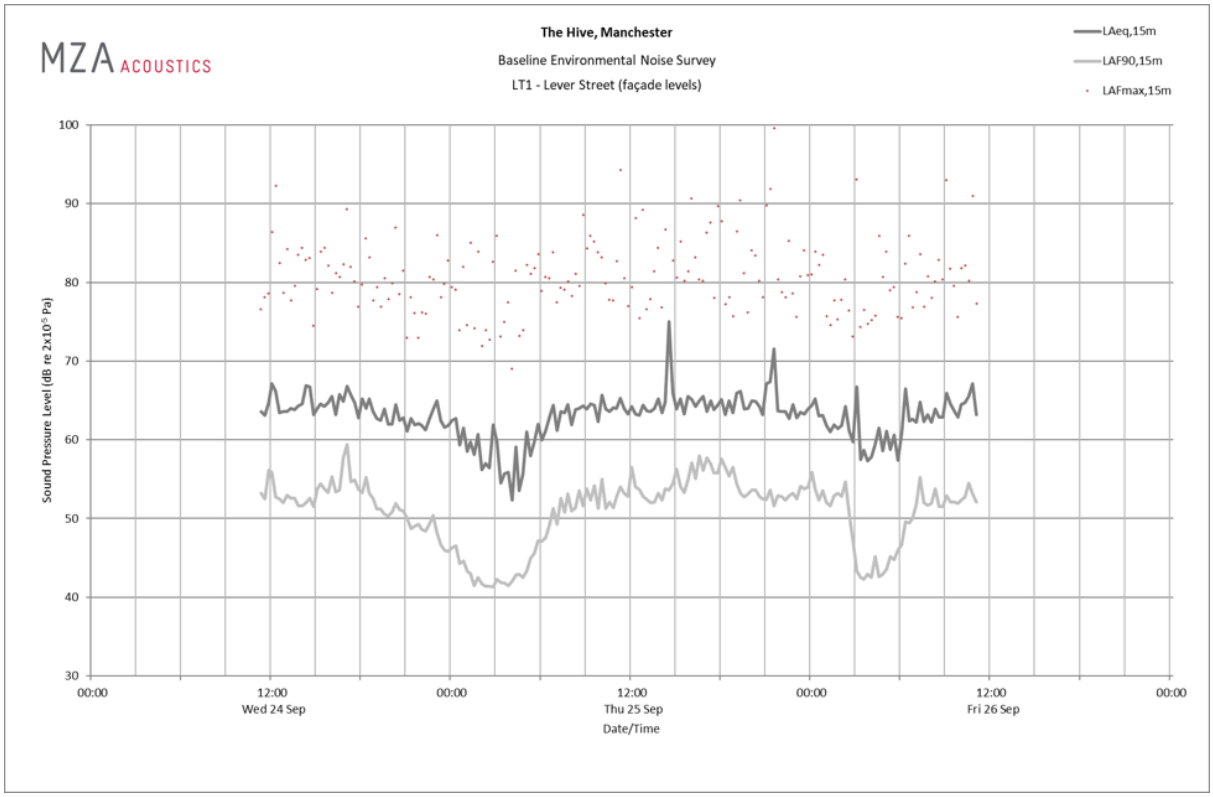
[1] Taken from the Foreword to BS 4142:2014 *Methods for rating and assessing industrial and commercial sound*.

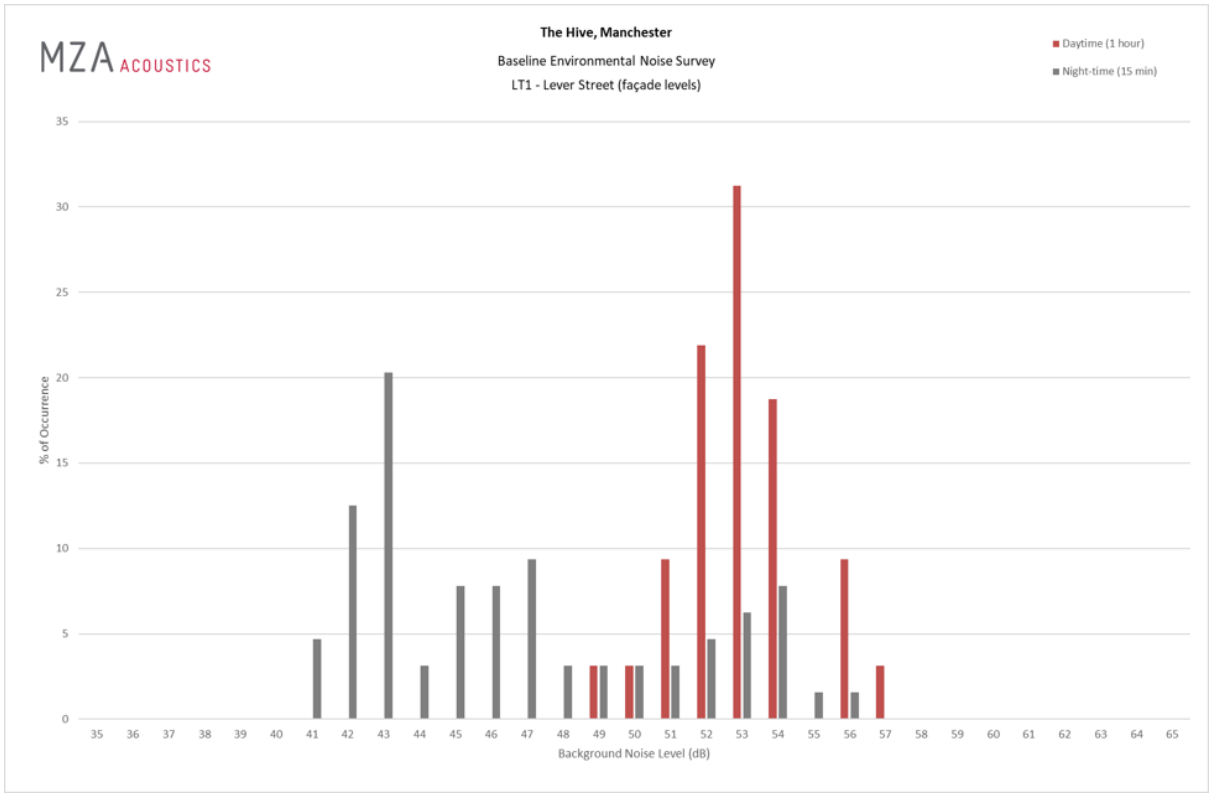
Airborne Sound	Sound that reaches the point of interest by propagation through air.
Ambient Sound:	Sound from all sources at any given time, form both near and far. Usually measured in terms of L_{Aeq}.
A-Weighting	The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies.
Background Sound Level	The A-weighted sound pressure level that can be considered the baseline in the absence of any noise from a specific source of sound under assessment. Measured in terms of $L_{A90, T}$.
Calibration	The measurement system/ chain should be periodically calibrated, within a laboratory, against traceable calibration instrumentation, to either National Standards or as UKAS-Accredited, as required. The calibration of the system should also be checked in the field using a portable calibrator before and after each short term measurements, and periodically for longer term monitoring.
Class 1	The Class of a sound level meter describes its accuracy as defined by the relevant international standards – Class 1 is more accurate than Class 2. The older standard IEC 60651 referred to the grade as "Type", whereas the new standard IEC 61672 refers to it as the "Class". The most accurate meters used in the field (as opposed to a laboratory) are Class 1. Class 2 meters can be used in some instances; however MZA use Class 1 (or Type 1) meters by default, as required by BS 4142:2014, for example.
Decibel	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds (s1 and s2) is given by 20 log10 (s1/s2). The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20 Pa.
Fast time Weighting (F)	Averaging time used in sound level meters. Defined in BS EN 61672-2:2013 Electroacoustics. Sound level meters. Pattern evaluation tests.
Free-field / Façade	Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5 m away.
IoA	The Institute of Acoustics is the UK's professional body for those working in acoustics, noise and vibration. It was formed in 1974 from the amalgamation of the Acoustics Group of the Institute of Physics and the British Acoustical Society (a daughter society of the Institution of Mechanical Engineers). It is a nominated body of the Engineering Council, offering registration at Chartered and Incorporated Engineer levels. All our consultants/ engineers are individual Members of the Institute.
$L_{AF90, T}$	The A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time fast time-weighting (F). Generally used to describe the 'background' sound conditions.
L_{AFmax}	The maximum A-weighted sound pressure level during a given time period. Lmax is sometimes used for the assessment of occasional loud sounds, which may have little effect on the overall L_{eq} noise level, but could still affect the sound environment. Unless described otherwise, it is measured using the fast time-weighting (F).

$L_{eq,T}$	A sound level index called the equivalent continuous sound level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded. Where the value is A-weighted, is will be presented '$L_{Aeq,T}$' or 'dBA $L_{eq,T}$', otherwise is should be an un-weighted (or linear) value.
L_p	See Sound Pressure Level.
Noise	Related to human response to sound. Unwanted sound, or sound that is considered undesirable or disruptive.
Octave Band	Frequency ranges in which the upper limit of each band is twice the lower limit. Octave bands are identified by their geometric mean frequency, or centre frequency.
Line Source	An idealised way of modelling a sound source, consisting of a uniform, flat plane.
Point Source	An idealised way of modelling a sound source, consisting of an infinitesimally small point, radiating sound equally in all dimensions
Sound Level Metrics	Sound levels usually fluctuate over time, so it is often necessary to consider an average or statistical sound level. This can be done in several ways, so a number of different metrics have been defined, according to how the averaging or statistics are carried out.
Sound Power	In a specified frequency band, the rate at which acoustic energy is radiated from a source. In general, the rate of flow of sound energy, whether from a source, through an area, or into an absorber.
Sound Power Level	Of airborne sound, ten times the common logarithm of the ratio of the sound power under consideration of the standard reference power of 1 pW. Expressed in decibels.
Sound Pressure	Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure.
Sound Pressure Level	The sound level is the sound pressure relative to a standard reference pressure of 20 Pa ($20x10^{-6}$ Pascals) on a decibel scale.
Specific Sound	The sound source being assessed in a BS 4142:2014 assessment.
UKAS	United Kingdom Accreditation Service, recognised by government to assess organisations that provide certification, testing, inspection and calibration services against internationally agreed standards.

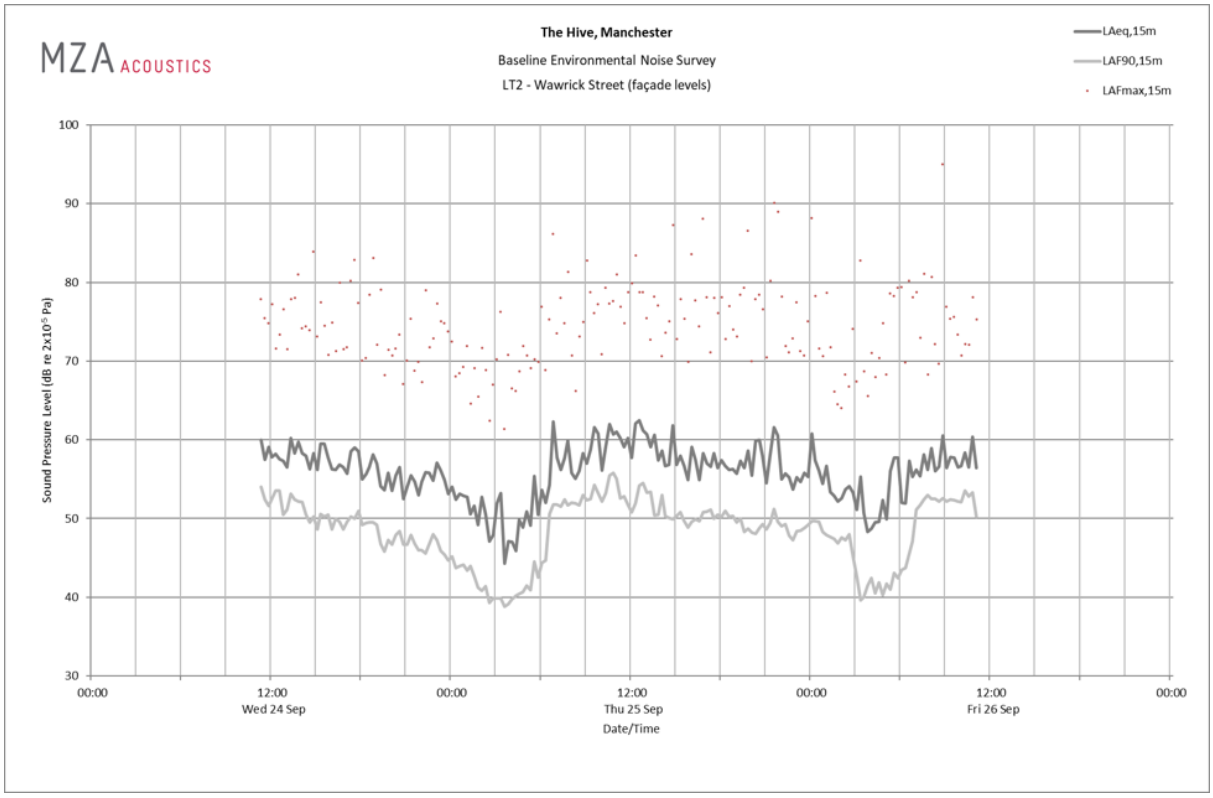
Appendix B – Time History and Histogram Analysis

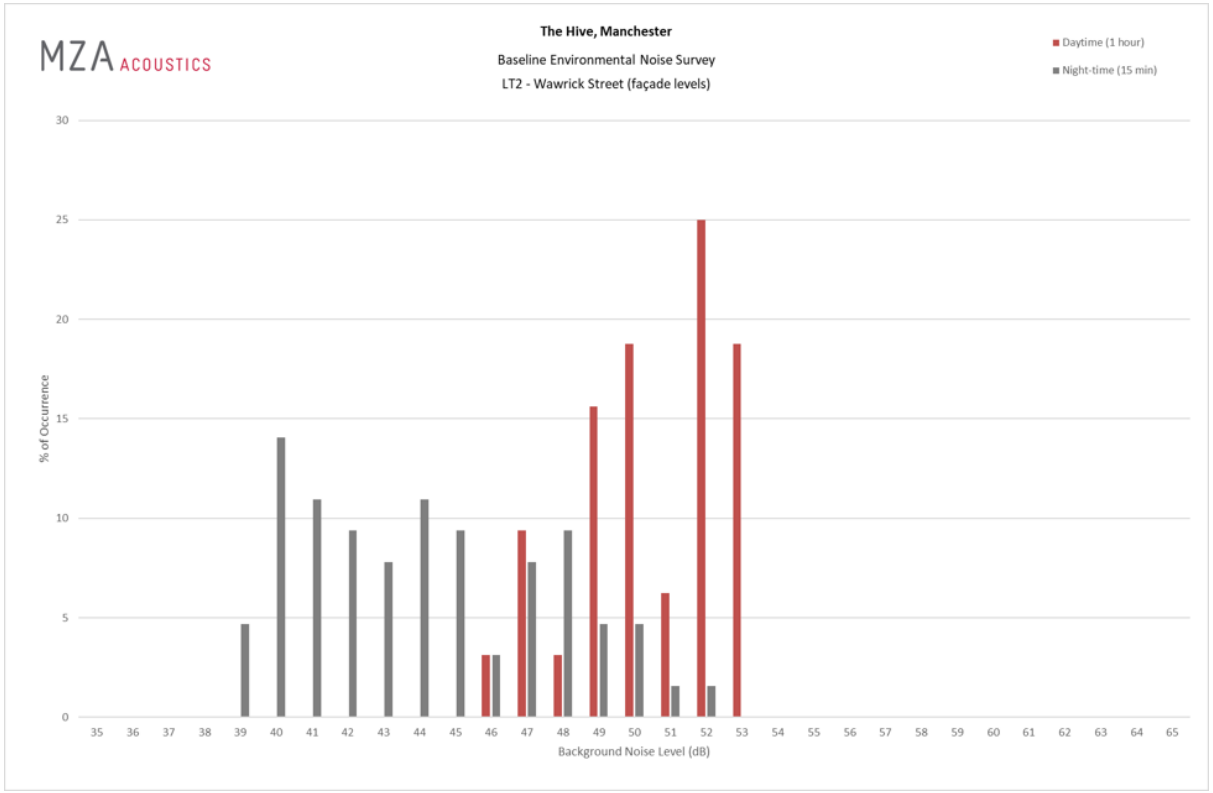
LT1





LT2


MZA ACOUSTICS
The Hive, Manchester
Baseline Environmental Noise Survey
LT2 - Wawrick Street (façade levels)
LAeq,15m
LAF90,15m
LAFmax,15m
Sound Pressure Level (dB re 2x10⁻⁵ Pa)
100
90
80
70
60
50
40
30
00:00
12:00
Wed 24 Sep
00:00
12:00
Thu 25 Sep
00:00
12:00
Fri 26 Sep
00:00
Date/Time


MZA ACOUSTICS
The Hive, Manchester
Baseline Environmental Noise Survey
LT2 - Wawrick Street (façade levels)
Daytime (1 hour)
Night-time (15 min)
% of Occurrence
30
25
20
15
10
5
0
35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65
Background Noise Level (dB)

Appendix C – Manufacturer Plant Noise Data

Unit Ref.	Model	Location	Description / Element	SWL/SPL	Sound Level (dB) at Octave Band Centre Frequency (Hz)								dBA
					63 [1]	125	250	500	1000	2000	4000	8000	
ODU 00-01	Daikin REYA16A9	Roof	Heating Mode LN5	SWL	81	73	75	75	66	62	58	56	74
			Cooling Mode LN1		87	81	80	81	74	71	70	65	81
ODU 00-02	Daikin REYA10A9	Roof	Heating Mode LN5	SWL	71	66	69	63	58	56	56	54	66
			Cooling Mode LN2		79	72	73	71	66	66	62	56	73
ODU 01-01	Daikin REYA22A9	Roof	Heating Mode LN5	SWL	75	72	73	68	62	60	60	58	70
			Cooling Mode LN2		84	81	78	76	70	70	67	60	78
ODU 01-02	Daikin REYA12A9	Roof	Heating Mode LN5	SWL	73	71	70	66	60	58	57	55	68
			Cooling Mode LN1		83	79	77	80	72	67	67	60	79
ODU 01-03	Daikin REYA16A9	Roof	Heating Mode LN5	SWL	81	73	75	75	66	62	58	56	74
			Cooling Mode LN2		83	75	78	78	70	69	65	61	78
ODU 01-04	Daikin REYA18A9	Roof	Heating Mode LN5	SWL	78	71	73	72	64	61	57	55	72
			Cooling Mode LN3		82	74	77	76	69	65	63	60	76
ODU 02-01	Daikin REYA16A9	Roof	Heating Mode LN5	SWL	81	73	75	75	66	62	58	56	74
			Cooling Mode LN4		77	71	74	72	64	60	57	56	72
ODU 02-02	Daikin REYA16A9	Roof	Heating Mode LN5	SWL	81	73	75	75	66	62	58	56	74
			Cooling Mode LN4		77	71	74	72	64	60	57	56	72
MVHR 0-05	Daikin VAM1000J	Level 00	Discharge - High Speed	In-duct SWL	*0*	51	55	57	66	58	53	47	67
			Intake - High Speed		*0*	45	46	47	54	47	42	34	56
MVHR 0-06	Daikin VAM1000J	Level 00	Discharge - Low Speed	In-duct SWL	*0*	45	48	51	57	51	45	37	59
			Intake - Low Speed		*0*	37	40	42	47	40	35	27	49
MVHR 0-07	Daikin VAM1000J	Level 00	Discharge - Low Speed	In-duct SWL	*0*	45	48	51	57	51	45	37	59
			Intake - Low Speed		*0*	37	40	42	47	40	35	27	49

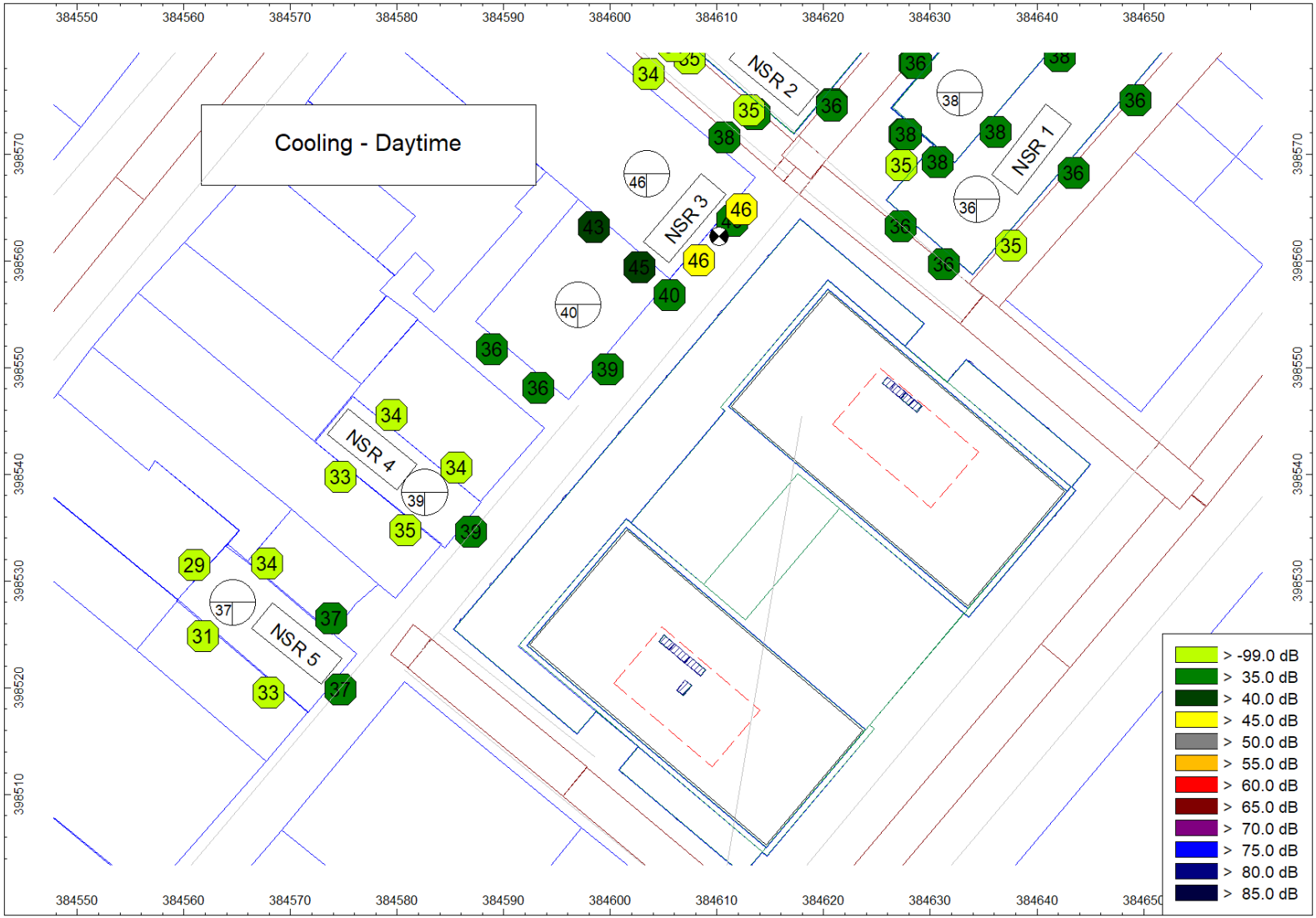
Unit Ref.	Model	Location	Description / Element	SWL/SPL	Sound Level (dB) at Octave Band Centre Frequency (Hz)								dBA
					63 [1]	125	250	500	1000	2000	4000	8000	
MVHR 1-01	Daikin VAM1000J	Level 01	Discharge - Low Speed	In-duct SWL	*0*	45	48	51	57	51	45	37	59
			Intake - Low Speed		*0*	37	40	42	47	40	35	27	49
MVHR 1-02	Daikin VAM1000J	Level 01	Discharge - High Speed	In-duct SWL	*0*	51	55	57	66	58	53	47	67
			Intake - High Speed		*0*	45	46	47	54	47	42	34	56
MVHR 1-03	Daikin VAM1000J	Level 01	Discharge - High Speed	In-duct SWL	*0*	51	55	57	66	58	53	47	67
			Intake - High Speed		*0*	45	46	47	54	47	42	34	56
MVHR 1-04	Daikin VAM1000J	Level 01	Discharge - High Speed	In-duct SWL	*0*	51	55	57	66	58	53	47	67
			Intake - High Speed		*0*	45	46	47	54	47	42	34	56
MVHR 1-05	Daikin VAM1000J	Level 01	Discharge - High Speed	In-duct SWL	*0*	51	55	57	66	58	53	47	67
			Intake - High Speed		*0*	45	46	47	54	47	42	34	56
MVHR 1-13	Daikin VAM1000J	Level 01	Discharge - High Speed	In-duct SWL	*0*	51	55	57	66	58	53	47	67
			Intake - High Speed		*0*	45	46	47	54	47	42	34	56
MVHR 1-17	Daikin VAM1000J	Level 01	Discharge - High Speed	In-duct SWL	*0*	51	55	57	66	58	53	47	67
			Intake - High Speed		*0*	45	46	47	54	47	42	34	56
MVHR 2-03	Daikin VAM1000J	Level 02	Discharge - High Speed	In-duct SWL	*0*	51	55	57	66	58	53	47	67
			Intake - High Speed		*0*	45	46	47	54	47	42	34	56
MVHR 2-07	Daikin VAM1000J	Level 02	Discharge - High Speed	In-duct SWL	*0*	51	55	57	66	58	53	47	67
			Intake - High Speed		*0*	45	46	47	54	47	42	34	56

Appendix D – Atmosphere Side Attenuator Minimum Performance Requirements

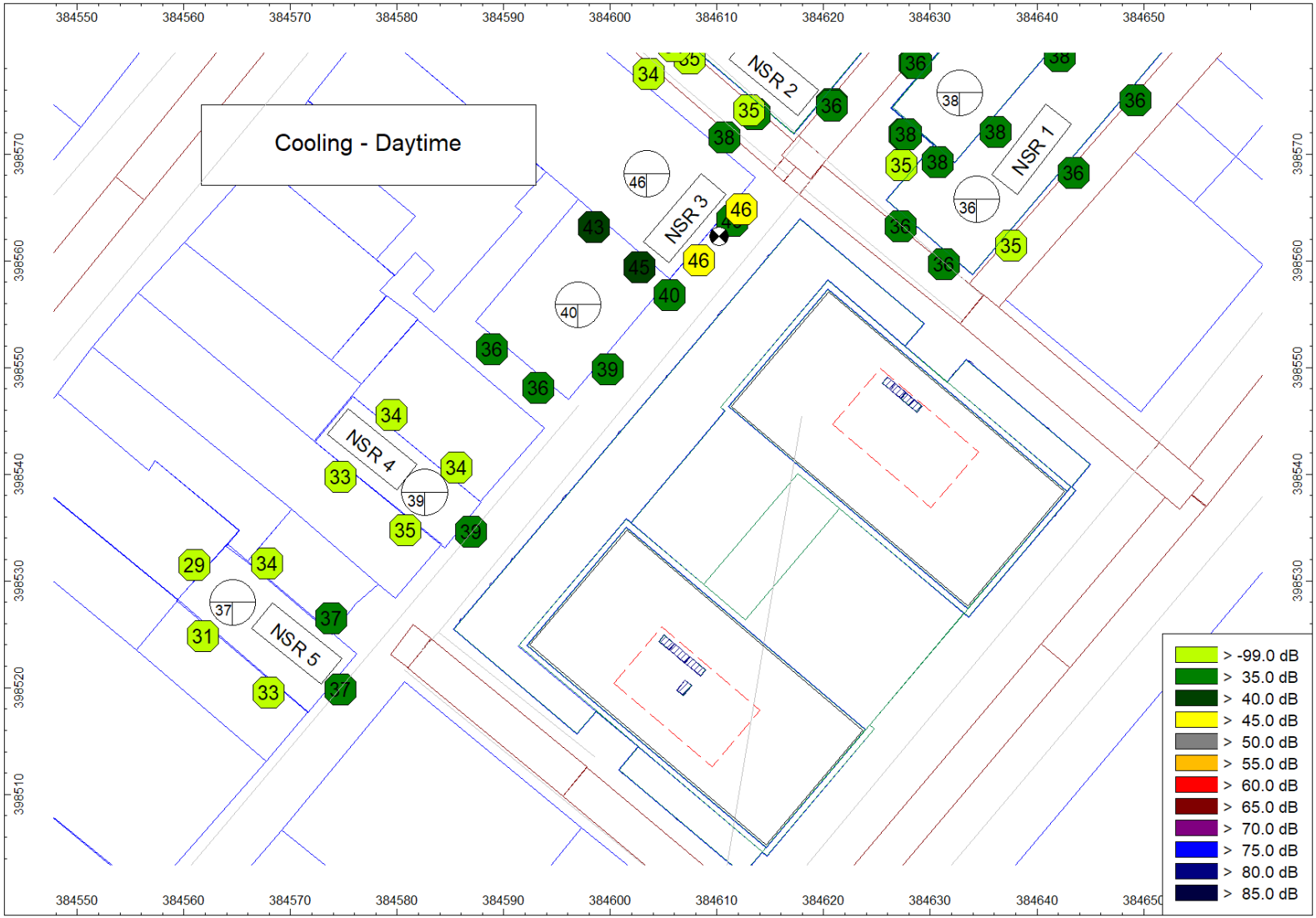
Attenuator Description		Associated Plant		Max PD (Pa)	Minimum Dynamic Insertion Loss (dB)							
Reference	Description	Plant Ref	Location		63	125	250	500	1k	2k	4k	8k
MVHR-0-05-EXH	Atmosphere side discharge attenuator	MVHR 0-05	L00	30	0	0	0	0	13	9	6	2
MVHR-0-06-EXH	Atmosphere side discharge attenuator	MVHR 0-06	L00	30	1	2	4	11	23	14	12	11
MVHR-0-06-FAI	Atmosphere side fresh air intake attenuator	MVHR 0-06	L00	30	1	2	4	11	23	14	12	11
MVHR-0-07-EXH	Atmosphere side discharge attenuator	MVHR 0-07	L00	30	1	2	4	11	23	14	12	11
MVHR-0-07-FAI	Atmosphere side fresh air intake attenuator	MVHR 0-07	L00	30	1	2	4	11	23	14	12	11
MVHR-1-01-EXH	Atmosphere side discharge attenuator	MVHR 1-01	L01	30	0	0	0	0	8	7	3	0
MVHR-1-02-EXH	Atmosphere side discharge attenuator	MVHR 1-02	L01	30	0	0	0	6	20	17	14	10
MVHR-1-02-FAI	Atmosphere side fresh air intake attenuator	MVHR 1-02	L01	30	0	0	0	0	11	9	6	0
MVHR-1-03-EXH	Atmosphere side discharge attenuator	MVHR 1-03	L01	30	0	0	0	5	20	16	14	10
MVHR-1-03-FAI	Atmosphere side fresh air intake attenuator	MVHR 1-03	L01	30	0	0	0	0	12	9	6	0
MVHR-1-04-EXH	Atmosphere side discharge attenuator	MVHR 1-04	L01	30	0	0	0	3	17	14	11	7
MVHR-1-04-FAI	Atmosphere side fresh air intake attenuator	MVHR 1-04	L01	30	0	0	0	0	9	6	3	0
MVHR-1-05-EXH	Atmosphere side discharge attenuator	MVHR 1-05	L01	30	0	0	0	9	24	20	17	13
MVHR-1-05-FAI	Atmosphere side fresh air intake attenuator	MVHR 1-05	L01	30	1	2	4	11	23	14	12	11
MVHR-1-13-EXH	Atmosphere side discharge attenuator	MVHR 1-13	L01	30	1	2	4	11	23	14	12	11
MVHR-1-17-EXH	Atmosphere side discharge attenuator	MVHR 1-17	L01	30	0	0	0	0	14	10	8	3
MVHR-1-17-FAI	Atmosphere side fresh air intake attenuator	MVHR 1-17	L01	30	0	0	0	0	11	9	6	0
MVHR-2-07-EXH	Atmosphere side discharge attenuator	MVHR 2-07	L02	30	0	0	0	9	24	20	17	13

Appendix E – 3D Computer Noise Model Results (dB, Facade Sound Pressure Level)

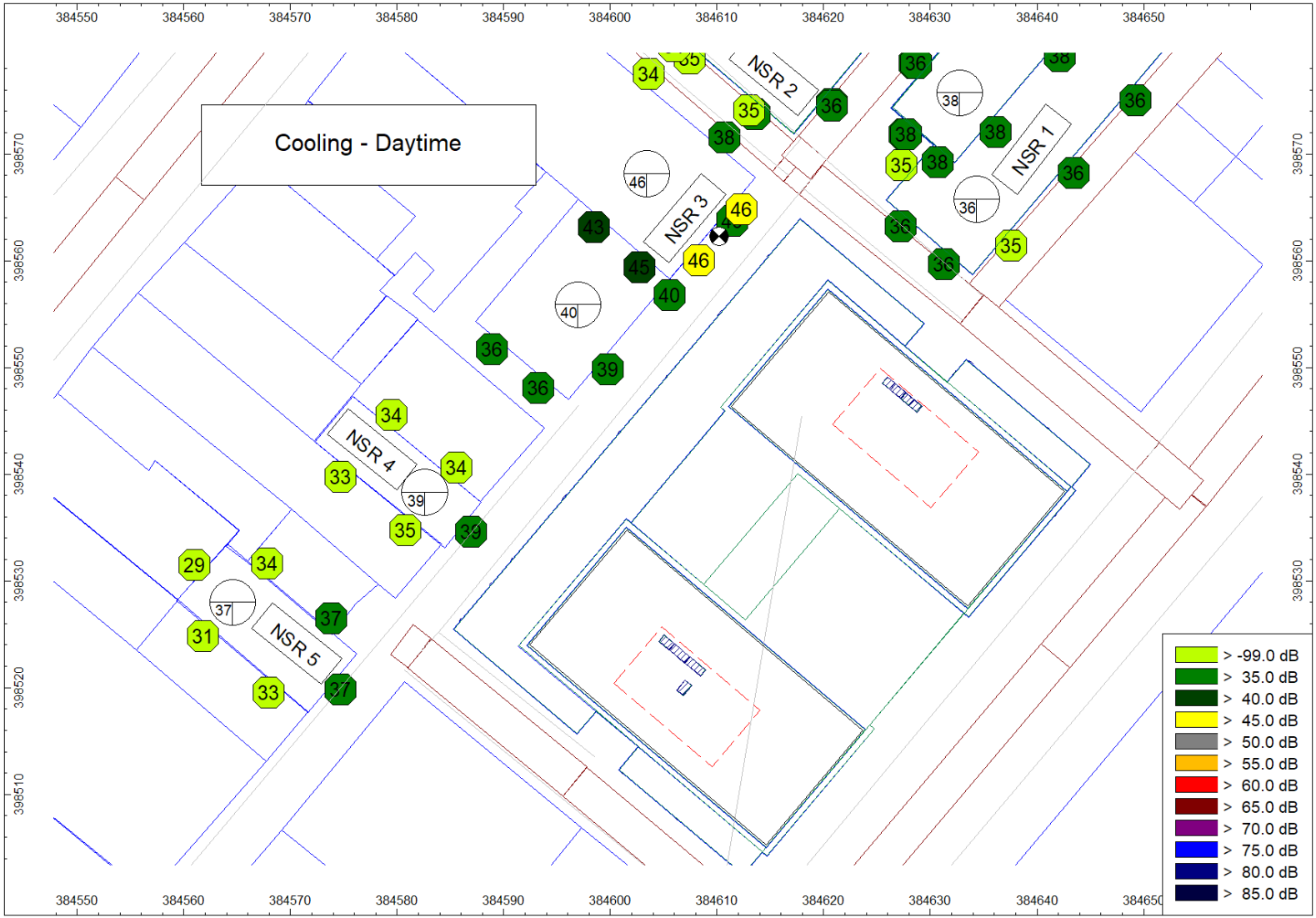
Daytime Cooling – Specific Noise Façade Sound Pressure Level



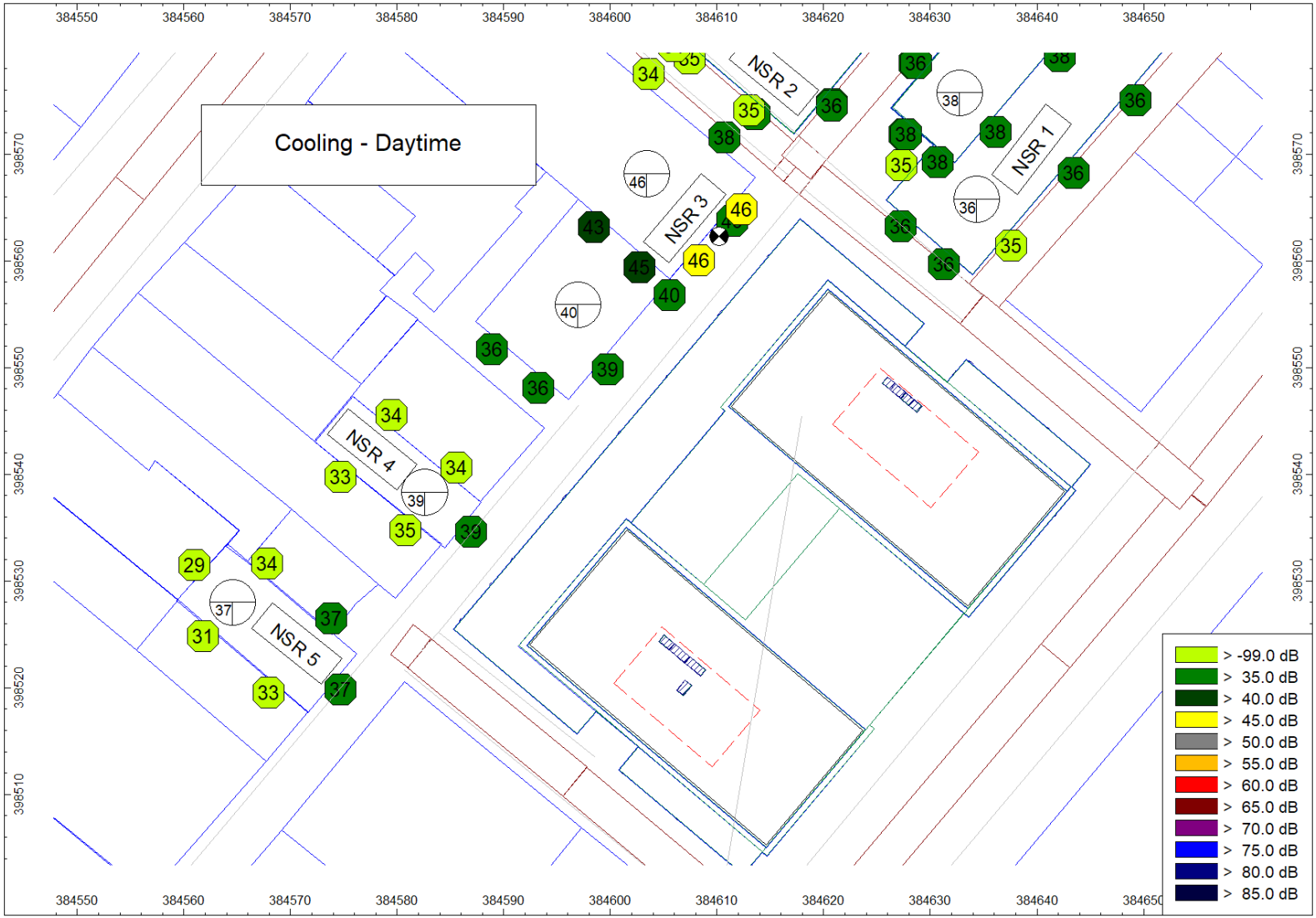
Daytime Heating – Specific Noise Façade Sound Pressure Level



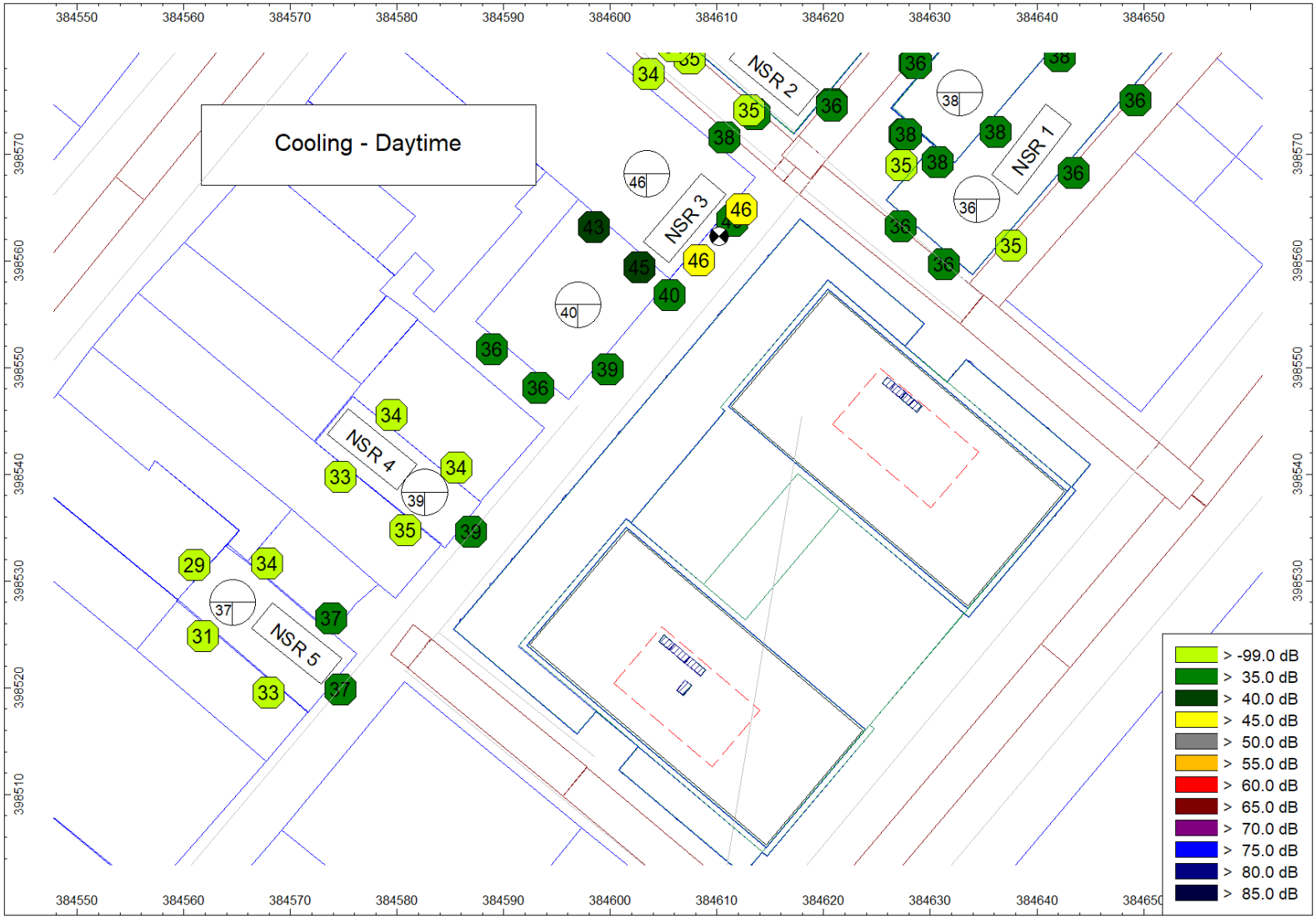
Night-time Heating Scenario 1 – Specific Noise Façade Sound Pressure Level



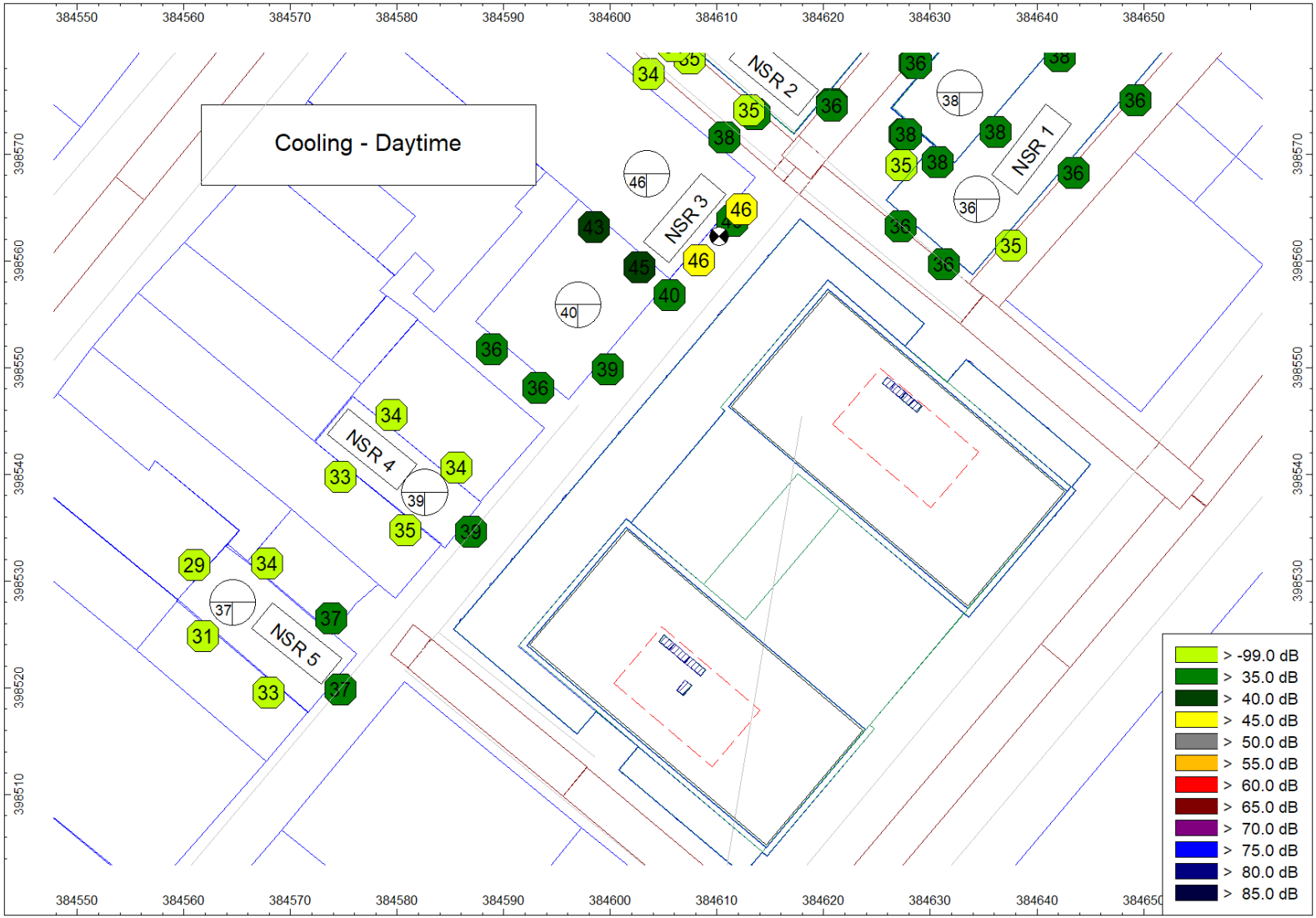
Night-time Heating Scenario 2 – Specific Noise Façade Sound Pressure Level



Night-time Heating Scenario 3 – Specific Noise Façade Sound Pressure Level



Night-time Heating Scenario 4 – Specific Noise Façade Sound Pressure Level



Partial Façade Sound Pressure Level at NSR 3

NSR	Period	Scenario	Plant Reference	Sound Pressure Level (dB) at NSR in Octave Band Centre Frequency (Hz)								dBA
				63	125	250	500	1000	2000	4000	8000	
3	Daytime	Cooling	VRV 00-01 Combined	46	40	38	39	32	29	28	19	39
			VRV 00-02 Combined	45	38	39	37	32	32	28	20	39
			VRV 01-01 Combined	43	39	36	34	27	28	24	14	36
			VRV 01-02 Combined	45	38	39	37	31	29	23	18	38
			VRV 01-03 Combined	46	38	41	40	32	29	28	23	40
			VRV 01-04 Combined	41	33	36	35	28	23	21	15	35
			VRV 02-01 Combined	35	29	32	30	21	17	14	10	30
			VRV 02-02 Combined	42	36	38	36	28	25	21	18	36
			MVHR 0-05 Dis	-51	-11	-1	1	-2	-7	-11	-22	3
			MVHR 0-05 FAI	-16	-13	-11	-4	-12	-18	-28	-67	-5
			MVHR 0-06 Dis	-43	-10	-8	-14	-20	-18	-26	-40	-11
			MVHR 0-06 FAI	-44	-19	-17	-22	-30	-30	-36	-51	-20
			MVHR 0-07 Dis	-43	-8	-5	-9	-15	-14	-22	-36	-7
			MVHR 0-07 FAI	-44	-18	-16	-21	-29	-29	-35	-50	-20
			MVHR 1-01 Dis	-39	-4	1	4	3	-1	-4	-14	7
			MVHR 1-01 FAI	-38	-9	-2	3	11	4	-2	-14	13
			MVHR 1-02 Dis	-36	6	13	12	8	3	1	-4	13
			MVHR 1-02 FAI	-38	-1	4	8	7	2	-1	-6	11
			MVHR 1-03 Dis	-36	6	13	13	8	4	0	-5	14
			MVHR 1-03 FAI	-34	3	10	14	10	6	3	-2	15
			MVHR 1-04 Dis	-32	11	16	15	11	7	4	0	17
			MVHR 1-04 FAI	-30	6	10	13	12	8	5	-2	16

NSR	Period	Scenario	Plant Reference	Sound Pressure Level (dB) at NSR in Octave Band Centre Frequency (Hz)								dBA
				63	125	250	500	1000	2000	4000	8000	
			MVHR 1-05 Dis	-29	14	21	17	12	8	5	1	19
			MVHR 1-05 FAI	-31	4	6	1	-3	-1	-5	-14	5
			MVHR 1-13 Dis	-54	-18	-17	-22	-26	-25	-30	-40	-18
			MVHR 1-13 FAI	-50	-13	-10	-8	0	-7	-15	-32	1
			MVHR 1-17 Dis	-42	-3	0	0	-6	-12	-19	-27	0
			MVHR 1-17 FAI	-45	-8	-3	0	-5	-11	-15	-24	0
			MVHR 2-03 Dis	-50	-7	-2	0	9	0	-8	-23	10
			MVHR 2-03 FAI	-50	-12	-9	-7	1	-7	-14	-29	2
			MVHR 2-07 Dis	-40	4	11	5	-1	-6	-10	-17	7
			MVHR 2-07 FAI	-44	-7	-4	-2	6	-2	-9	-25	8
3	Daytime	Heating	VRV 00-01 Combined	40	32	33	33	24	20	16	10	33
			VRV 00-02 Combined	37	32	35	29	24	22	22	18	32
			VRV 01-01 Combined	34	30	31	26	19	18	17	12	28
			VRV 01-02 Combined	38	36	35	31	25	23	21	17	33
			VRV 01-03 Combined	47	38	40	40	31	27	23	19	39
			VRV 01-04 Combined	37	30	32	31	23	19	15	10	31
			VRV 02-01 Combined	39	31	33	33	23	19	15	10	32
			VRV 02-02 Combined	46	38	39	39	30	27	22	18	39
			MVHR 0-05 Dis	-51	-11	-1	1	-2	-7	-11	-22	3
			MVHR 0-05 FAI	-16	-13	-11	-4	-12	-18	-28	-67	-5
			MVHR 0-06 Dis	-43	-10	-8	-14	-20	-18	-26	-40	-11
			MVHR 0-06 FAI	-44	-19	-17	-22	-30	-30	-36	-51	-20
			MVHR 0-07 Dis	-43	-8	-5	-9	-15	-14	-22	-36	-7

NSR	Period	Scenario	Plant Reference	Sound Pressure Level (dB) at NSR in Octave Band Centre Frequency (Hz)								dBA
				63	125	250	500	1000	2000	4000	8000	
			MVHR 0-07 FAI	-44	-18	-16	-21	-29	-29	-35	-50	-20
			MVHR 1-01 Dis	-39	-4	1	4	3	-1	-4	-14	7
			MVHR 1-01 FAI	-38	-9	-2	3	11	4	-2	-14	13
			MVHR 1-02 Dis	-36	6	13	12	8	3	1	-4	13
			MVHR 1-02 FAI	-38	-1	4	8	7	2	-1	-6	11
			MVHR 1-03 Dis	-36	6	13	13	8	4	0	-5	14
			MVHR 1-03 FAI	-34	3	10	14	10	6	3	-2	15
			MVHR 1-04 Dis	-32	11	16	15	11	7	4	0	17
			MVHR 1-04 FAI	-30	6	10	13	12	8	5	-2	16
			MVHR 1-05 Dis	-29	14	21	17	12	8	5	1	19
			MVHR 1-05 FAI	-31	4	6	1	-3	-1	-5	-14	5
			MVHR 1-13 Dis	-54	-18	-17	-22	-26	-25	-30	-40	-18
			MVHR 1-13 FAI	-50	-13	-10	-8	0	-7	-15	-32	1
			MVHR 1-17 Dis	-42	-3	0	0	-6	-12	-19	-27	0
			MVHR 1-17 FAI	-45	-8	-3	0	-5	-11	-15	-24	0
			MVHR 2-03 Dis	-50	-7	-2	0	9	0	-8	-23	10
			MVHR 2-03 FAI	-50	-12	-9	-7	1	-7	-14	-29	2
			MVHR 2-07 Dis	-40	4	11	5	-1	-6	-10	-17	7
			MVHR 2-07 FAI	-44	-7	-4	-2	6	-2	-9	-25	8
3	Night-time	Heating Scenario 1	VRV 00-01 Combined	40	32	33	33	24	20	16	10	33
			VRV 00-02 Combined	37	32	35	29	24	22	22	18	32
3	Night-time	Heating Scenario 2	VRV 01-01 Combined	34	30	31	26	19	18	17	12	28
			VRV 01-02 Combined	38	36	35	31	25	23	21	17	33

NSR	Period	Scenario	Plant Reference	Sound Pressure Level (dB) at NSR in Octave Band Centre Frequency (Hz)								dBA
				63	125	250	500	1000	2000	4000	8000	
3	Night-time	Heating Scenario 3	VRV 01-02 Combined	38	36	35	31	25	23	21	17	33
			VRV 01-04 Combined	37	30	32	31	23	19	15	10	31
3	Night-time	Heating Scenario 4	VRV 01-02 Combined	39	31	33	33	23	19	15	10	32
			VRV 02-01 Combined	38	36	35	31	25	23	21	17	33

Appendix F – Report Limitations

This report has been prepared for the titled project or named part thereof and should not be used in whole or part and relied upon for any other project without the written authorisation of MZA Acoustics Limited. MZA Acoustics Limited accepts no responsibility or liability for the consequences of this document if it is used for a purpose other than that for which it was commissioned. Persons wishing to use or rely upon this report for other purposes must seek written authority to do so from the owner of this report and/ or MZA Acoustics Limited and agree to indemnify MZA Acoustics Limited for any and all loss or damage resulting therefrom. MZA Acoustics Limited accepts no responsibility or liability for this document to any other party other than the person by whom it was commissioned.

The findings and opinions expressed are relevant to the dates of the site works and should not be relied upon to represent conditions at substantially later dates. Opinions included therein are based on information gathered during the study and from our experience. If additional information becomes available which may affect our comments, conclusions or recommendations MZA Acoustics Limited reserve the right to review the information, reassess any new potential concerns and modify our opinions accordingly.

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